

STATEMENT OF LEGAL AND FACTUAL BASIS

Virginia State University (VSU)
Route 36 North, Petersburg ,Chesterfield County, Virginia
Permit No. PRO-50298

Title V of the 1990 Clean Air Act Amendments required each state to develop a permit program to ensure that certain facilities have federal Air Pollution Operating Permits, called Title V Operating Permits. As required by 40 CFR Part 70 and 9 VAC 5 Chapter 80, Virginia State University has applied for a Title V Operating Permit for its fossil fuel-fired steam generating plant. The Department has reviewed the application and has prepared a Title V Operating Permit.

Engineer/Permit Contact: _____ Date: _____

Air Permit Manager: _____ Date: _____

Director, DEQ : _____ Date: _____

FACILITY INFORMATION

Permittee

Virginia State University
P.O. Box 9414
Suite 60
Petersburg, Virginia 23806

Facility

Virginia State University
Route 36 North
Chesterfield County
Petersburg, Virginia

Responsible Official

Edward J. Mazar
Vice President

Contact Person

Jim Hamilton
Power Plant Superintendent
804-524-5383

County-Plant Identification Number: 041-0062

SOURCE DESCRIPTION

SIC Code: 8221 – Colleges, Universities, and Professional Schools

The facility is a fossil fuel-fired steam generating plant which is operated by Virginia State University (VSU) in order to provide heat and hot water for the campus.

The facility is a Title V major source of sulfur dioxide emissions. This source is located in an attainment area for all criteria pollutants. The facility is currently permitted under two New Source Review permits. The NSR permit dated September 22, 1997 permitted the 66.6 MMBtu/hr Detroit Stoker boiler (EU-4) to use distillate oil or natural gas. The August 20, 1997 NSR permit was for the 20.2 MMBtu/hr Keeler boiler with a multicyclone. All the other boilers at the facility are existing boilers which were

constructed before March 17, 1972.

COMPLIANCE STATUS

The facility is scheduled to be inspected once a year.

The last inspection was conducted on September 7, 2000. The facility was found to be in compliance.

SIGNIFICANT EMISSION UNITS

The significant emissions units at this facility consist of the following :

Emission Unit No.	Stack No.	Emission Unit Description	Rated Capacity
EU-01	S1	#6 oil fired boiler	34.3 MMBtu/hr (heat input)
EU-02	S1	Coal fired boiler	20.2 MMBtu/hr (heat input)
EU-03	S2	#6 oil fired boiler	60 MMBtu/hr (heat input)
EU-04	S1	Natural gas/#2 oil fired boiler	66.6 MMBtu/hr (heat input)
EU-11	N/A	natural gas fired boiler	16.6 MMBtu/hr (heat input)

Control Equipment

Emission Unit No. EU-2 20.2 MMBtu/hr Keeler boiler has a multicyclone which controls fly ash emissions as required by the August 20, 1997 permit.

Emission Unit No. EU-4 66.6 MMBtu/hr Detroit Stoker boiler has a multicyclone which controls fly ash emissions as shown by their July 7, 1998 Title V permit application. However the September 22, 1997 NSR permit does not require this control equipment.

EMISSIONS INVENTORY

A copy of the 1999 annual emission update is attached as Attachment 9. The actual annual emissions from the facility as reported by the facility were 1.09 tons of VOC, 26.69 tons of NO_x, 133.2 tons of SO₂, 5.91 tons of PM₁₀, and 1.39 of TNMOC per year.

20.2 MMBTU/HR KEELER BOILER REQUIREMENTS (Emission Unit ID #EU-02)

Limitations

The 20.2 MMBtu/hr Keeler coal fired boiler (Emission Unit ID # EU-02) has the following applicable requirements, from the conditions of the August 20, 1997 NSR permit:

Condition # 3

Requires that the Keeler boiler (Emission Unit ID # EU-02) particulate emissions be controlled by a multicyclone and that the multicyclone have adequate access for inspection.

Condition # 4

Limits the fuel for the Keeler boiler (Emission Unit ID # EU-02) to coal.

Condition # 5

Limits the consumption of fuel for the Keeler boiler (Emission Unit ID # EU-02) to 5,250 tons per year.

Condition # 6

Limits the sulfur and ash content of the coal for the Keeler boiler (Emission Unit ID # EU-02) to maximum of 1% and 7% by weight. Recordkeeping requirements for this condition have been moved to the recordkeeping section.

Condition # 8

Specifies emission limits for the Keeler boiler (Emission Unit ID # EU-02) which include the following:

PM-10	0.27 lbs/10 ⁶ Btu	5.5 lbs/hr	19.0 tons/yr*
Sulfur Dioxide	1.38 lbs/10 ⁶ Btu	28.0 lbs/hr	97.7 tons/yr*
Nitrogen Oxides	0.42 lbs/10 ⁶ Btu	8.5 lbs/hr	29.9 tons/yr*
Carbon Monoxide	0.49 lbs/10 ⁶ Btu	9.9 lbs/hr	34.7 tons/yr*
Volatile Organic Compounds	0.60 lbs/10 ⁶ Btu	1.20 lbs/hr	4.1 tons/yr*

* Annual facility emissions shall be determined monthly as the sum of each consecutive 12 month period.

Calculations have been included in Attachment 1 to demonstrate how these limits were obtained.

Condition # 9

Limits the amount of visible emissions from the Keeler boiler (Emission Unit ID # EU-02) to 20 percent except during one six-minute period in any one hour in which visible emissions shall not exceed 30 percent opacity as determined by EPA Method 9. This condition applies at all times except during start-up, shutdown, or malfunction.

Periodic Monitoring and Recordkeeping

A new condition has been added for periodic monitoring for Conditions # 4, 5, & 6 of the August 20, 1997 NSR permit. A coal supplier certification form is now required for all coal shipments.

The monitoring requirements in Conditions # 7 & 3 of the August 20, 1997 NSR permit have been modified to meet Part 70 requirements to include the following:

Condition # 7

Requires that a continuous emission monitor (changed wording to continuous opacity monitor) will measure the Keeler boiler's (Emission Unit ID # EU-02) concentration of opacity and that its readings will be recorded.

Periodic Monitoring for Condition # 7: The source shall verify opacity limits from the COM output recorded on the continuous monitor measured as a six-minute average. The system shall be installed and operated in accordance with 40 CFR Part 60.13.

All records from the COM will be kept by the facility and shall be current for the most recent five (5) years.

Condition # 3

The source shall use differential pressure across the multicyclone, using differential pressure gauges, to check for low collection efficiencies. The source must first establish a baseline differential pressure that represents proper operating conditions.

The permit includes requirements for maintaining records of all monitoring and testing required. The recordkeeping requirements in Conditions # 6 & 10 of the August 20, 1997 NSR permit have been modified to meet Part 70 requirements to include the following:

Condition # 6 & 10

- Yearly throughput of coal and coal shipments indicating sulfur and ash content per shipment
- All coal supplier certifications.
- Emission factors used to calculate hourly and annual emissions
- Formulas used to calculate hourly and annual emissions.
- All records generated by the continuous opacity monitor.

Condition # 14 & 15

Requires the facility to develop a maintenance schedule and maintain records of all scheduled and non-schedule maintenance. Written operating procedures shall be kept for equipment. All operators shall be trained and be familiarized with the written operating procedures. Records shall be kept of all training. An inventory of spare parts shall be kept. These conditions have been updated to the new boilerplate format and placed in the facility wide requirements section.

Testing

For purposes of compliance determination, stack testing is required for the Keeler boiler (Emission Unit ID # EU-02). Testing is required for PM10, Sulfur Dioxide, Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compounds. Refer to the table in the 20.2 MMBtu/hr Keeler Boiler Requirements conditions of the permit for the test methods that shall be used when performing these tests. The first stack tests are required to be conducted within 180 days of permit issuance. After these initial stack tests, stack tests shall be performed every 5 years (once per permit term).

Streamlined Requirements

The following conditions or portions of conditions in the 8/20/97 NSR permit have not been included for the reasons provided:

Condition # 7

The requirement for the continuous emission monitor to monitor O2 and CO2 has been deleted. The CEM is still required for opacity readings. There is no valid reason or regulation found to keep monitoring O2 and CO2 emissions.

Conditions # 11, 12, 13, 16, 17, & 18

These conditions are general conditions associated with the NSR program that contain no specific requirements. Further, they are either obsolete, inapplicable to the Title V program, or superceded by equivalent conditions in the General section of the Title V permit. For these reasons, they will not be included in the Title V permit.

66.6 MMBTU/HR ERIE CITY BOILER REQUIREMENTS (Emission Unit ID #EU-04)

Limitations

The 66.6 MMBtu/hr Erie City boiler (Emission Unit ID # EU-04) has the following applicable requirements, from the conditions of the September 22, 1997 NSR permit:

Condition # 3

Limits the consumption of natural gas for the Erie City boiler (Emission Unit ID # EU-04) to 583×10^6 cubic feet per year.

Limits the consumption of distillate oil for the Erie City boiler (Emission Unit ID # EU-04) to 1,042,437 gallons per year.

Condition # 4

Limits the hours of operation for the Erie City boiler (Emission Unit ID # EU-04) on distillate oil to 2160 hours per year and on natural gas to 8760 hours per year.

Specifies emission limits for the Erie City boiler (Emission Unit ID # EU-04) include the following:

Total Suspended Particulate	0.97 lbs/hr	4.05 tons/yr*
PM-10	0.97 lbs/hr	4.05 tons/yr*
Sulfur Dioxide	34.27 lbs/hr	37.14 tons/yr*
Nitrogen Oxides (as NO ₂)	9.65 lbs/hr	37.14 tons/yr*
Carbon Monoxide	2.41 lbs/hr	10.30 tons/yr*
Volatile Organic Compounds	0.19 lbs/hr	0.82 tons/yr*

* Annual facility emissions shall be determined monthly as the sum of each consecutive 12 month

period.

Calculations have been included in Attachment 2 to demonstrate how these limits were obtained.

Condition # 5

Visible emissions from the Erie City boiler (Emission Unit ID # EU-04) stack are limited to 10 % opacity except during one six-minute period in any one hour in which visible emissions shall not exceed 20 % opacity. This condition applies at all times except during start-up, shutdown, or malfunction.

Condition # 8

Limits the Erie City boiler (Emission Unit ID # EU-04) to use distillate oil and natural gas only. Defines distillate oil as fuel oil that meets the specifications for fuel oil numbers 1 or 2 under the American Society for Testing and Materials, ASTM D396-78 "Standard Specification for Fuel Oils".

Condition # 9

Limits the sulfur content of the oil to be burned in the Erie City boiler (Emission Unit ID # EU-04) to a maximum of 0.5 percent by weight per shipment. The permittee is required to obtain a certification from the fuel supplier of each shipment of distillate oil which includes the name of the fuel supplier, the date on which the oil was received, the volume of distillate oil delivered in the shipment, a statement that the oil complies with the American Society for Testing and Materials specifications for fuel oil number 1 or 2, and the sulfur content of the oil.

Periodic Monitoring and Recordkeeping

The monitoring requirements in Condition #5 of the September 22, 1997 NSR permit have been modified to meet Part 70 requirements to include the following:

The source shall perform visual inspections weekly to determine opacity of the Erie City boiler (Emission Unit ID # EU-04) as determined by EPA Method 9 and report all deviations.

The permit includes requirements for maintaining records of all monitoring and testing required by the permit. The recordkeeping requirements in Condition #12 of the September 22, 1997 NSR permit have been modified to meet Part 70 requirements to include the following:

- Yearly throughput of natural gas and distillate oil
- Annual hours of operation of the Erie City boiler (Emission Unit ID # EU-04) using distillate and natural gas, calculated monthly as the sum of each consecutive (12) month period.
- All fuel supplier certifications for distillate oil.
- Emission factors used to calculate hourly and yearly emissions
- Formulas used to calculate hourly and yearly emissions.
- Observations records of all weekly opacity checks and any corresponding actions taken.

Condition #10

Requires the facility to develop a maintenance schedule and maintain records of all scheduled and non-schedule maintenance. Written operating procedures shall be kept for equipment. All operators shall be trained and be familiarized with the written operating procedures. Records shall be kept of all training. This condition has been updated to the new boilerplate format to include an inventory of spare parts. This condition has been moved to the facility wide requirements section.

Testing

For purposes of compliance determination, stack testing is required for the Erie City boiler (Emission Unit ID # EU-04). Testing is required for Total Suspended Particulates, PM10, Sulfur Dioxide, Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compounds. Refer to the table in the 66.6 MMBtu/hr Erie City Boiler Requirements conditions of the permit for the test methods that shall be used when performing these tests. The first stack tests are required to be conducted within 180 days of permit issuance. After these initial stack tests, stack tests shall be performed every 5 years (once per permit term).

Streamlined Requirements

The following conditions in the September 22,1997 NSR permit have not been included for the reasons provided:

Condition # 6

Requires an initial visible emission evaluation on the Erie City boiler (Emission Unit ID # EU-04) stack when firing oil. This condition has not been included since the facility stated in their comments received June 19, 2001 that the evaluation test was conducted on May 11, 2000.

Condition # 7

Requires that the facility be constructed to allow for emission testing at any time using appropriate methods. This condition has been moved to the facility wide conditions. It also required that test ports be provided on the boiler stack. The test ports statement has been removed since the facility stated in their comments received June 19, 2001 that the Erie City boiler (Emission Unit ID # EU-04) ducts leading to the stack have test ports.

Condition # 11

Requires the facility to provide a written notification of the actual date on which construction of the Erie City boiler (Emission Unit ID # EU-04) commenced, the anticipated and actual date of the start up of the Erie City boiler (Emission Unit ID # EU-04), and the anticipated date of the visible emission evaluation. This condition has not been included since the facility stated in a their comments received June 19, 2001 that the construction date of the Erie City boiler (Emission Unit ID # EU-04) was July of 1997 and the start up date of the boiler was February 24, 2000.

Conditions # 13, 14, 15, 16, 17, 18 & 19

These conditions are general conditions associated with the NSR program that contain no specific requirements. Further, they are either obsolete, inapplicable to the Title V program, or superseded by equivalent conditions in the General section of the Title V permit. For these reasons, they will not be included in the Title V permit.

EXISTING SOURCE BOILER REQUIREMENTS (Emission Unit ID # EU-01, EU-03, and EU-11)

Limitations

The existing source boilers have the following applicable requirements, from the conditions of the requirements of Rule 4-8

Condition # 1

Limits the fuel for the 34.33 MMBtu/hr boiler (Emission Unit ID # EU-01) to No. 6 fuel oil.

Condition #2

Limits the fuel for the 60.1 MMBtu/hr boiler (Emission Unit ID # EU-03) to No. 6 fuel oil.

Condition #3

Limits the fuel for the 16.6 MMBtu/hr boiler (Emission Unit ID # EU-11) to natural gas.

Condition #4

Specifies emission limits for the 34.33 MMBtu/hr boiler (Emission Unit ID # EU-01) to the following:

PM10	11.0	lbs/hr
SO2	90.7	lbs/hr

Calculations have been included in Attachment 3 to demonstrate how the limits were obtained.

Condition # 5

Specifies emission limits for the 60.1 MMBtu/hr boiler (Emission Unit ID # EU-03) to be the following:

PM10	19.2	lbs/hr
SO2	158.7	lbs/hr

Calculations have been included in Attachment 3 to demonstrate how the limits were obtained.

Condition # 6

Specifies emission limits for the 16.6 MMBtu/hr boiler (Emission Unit ID # EU-11) to be the following:

PM10	5.4	lbs/hr
SO2	43.9	lbs/hr

Calculations have been included in Attachment 3 to demonstrate how these limits were obtained.

Condition # 7

Limits the amount of visible emissions from each boiler (Emission Unit ID # EU-01, 03, 11) to 20 percent except during one six-minute period in any one hour in which visible emissions shall not exceed 60 percent opacity.

PERIODIC MONITORING AND RECORDKEEPING

Condition # 1

Requires the facility to obtain certification form from all fuel suppliers with each shipment of residual oil. The certification is required to include the name of the supplier, the date on which the residual oil was received, the volume of residual oil delivered in the shipment, a statement that the oil complies with the American Society for Testing and Materials specification for residual number 6 and the sulfur content of the residual oil. These records are required to be kept for at least the most recent five years.

Condition # 2

Requires visual inspections to be performed weekly to determine opacity of each boiler (Emission Unit ID # EU-01, 03, 11) as determined by EPA Method 9 and to report all deviations. If the opacity exceeds 20 percent opacity except during one six-minute period in any one hour in which visible emissions shall not exceed 60 percent opacity, the source shall perform EPA Method 9 testing.

Condition # 3

Requires records of all fuel supplier certifications, emissions factors used to calculate hourly emissions, formulas used to calculate hourly emissions, and results of weekly opacity observations. These records are required to be kept for the most recent five years.

Note:

Emission calculations using AP-42 factors are attached as Attachments 4,5,6 and 7. These calculations were performed in order to determine compliance by comparing these values with the existing boiler calculation limits (Rule 4-8) as shown in Attachment 3.

A maximum sulfur content for the # 6 fuel oil was calculated using the existing sulfur emission limit in order to compare the existing source limitations to AP-42 limitations. The maximum sulfur was calculated to be 2.5%. This value is considered to be a conservative value since most fuel oils fall

between .5% and 2% sulfur content. In 1999, the facility based on the years inventory report used 2% sulfur content #6 fuel oil which is under the maximum of 2.5% sulfur content. 2.5 % was used in the AP-42 calculations as the maximum in determining the TSP, PM₁₀ and SO₂ emission factors which are based on the sulfur content.

The AP-42 calculations verify that if the fuel is under 2.5% sulfur the fuel boilers are in compliance. Calculations of factors and equations will be used for periodic monitoring if the fuel is ever greater than 2.5%. It can be concluded that all three existing boilers (Emission Unit ID # EU-01, EU-03, and EU-11) will be in compliance with the existing source calculations limits since all the AP-42 calculated limits were less than the existing source calculations (presuming a fuel sulfur content of less than 2.5%). Refer to Attachment 7 for a table comparing the two calculation limits.

FACILITY WIDE CONDITIONS

Testing

The permitted facility shall be constructed so as to allow for emissions testing at any time using appropriate methods. Upon request from the Department, test ports shall be provided at the appropriate locations.

If testing is conducted in addition to the monitoring specified in this permit, the permittee shall use the following test methods in accordance with procedures approved by the DEQ as follows:

Pollutant	Test Method (40 CFR Part 60, Appendix A)
VOC	EPA Methods 18, 25, 25a
VOC Content	EPA Methods 24, 24a
NO _x	EPA Method 7
SO ₂	EPA Method 6
CO	EPA Method 10
PM/PM-10	EPA Method 5, 17
Visible Emission	EPA Method 9

GENERAL CONDITIONS

The permit contains general conditions required by 40 CFR Part 70 and 9 VAC 5-80-110, that apply to all Federal-operating permit sources. These include requirements for submitting semi-annual monitoring reports and an annual compliance certification report. The permit also requires notification of deviations from permit requirements or any excess emissions, including those caused by upsets, within

one business day.

Comments on General Conditions

B: Permit Expiration

This condition refers to the Board taking action on a permit application. The Board referred to is the State Air Pollution Control Board. The authority to take action on permit application(s) has been delegated to the Regions as allowed by ' 2.1-20.01:2 and ' 10.1-1185 of the *Code of Virginia*, and the "Department of Environmental Quality Agency Policy Statement NO. 3-2001".

This general conditions cites the entire Article(s) that follow:

B.2. Article 1 (9 VAC 5-80-50 et seq.), Part II of 9 VAC 5 Chapter 80. Federal Permits for Stationary Sources

B.3. Article 1 (9 VAC 5-80-50 et seq.), Part II of 9 VAC 5 Chapter 80. Federal Permits for Stationary Sources

This general condition cites the sections that follow:

- B. 9 VAC 5-80-80. "Application"
- B.2. 9 VAC 5-80-150. "Action on Permit Applications"
- B.3. 9 VAC 5-80-80. "Application"
- B.4. 9 VAC 5-80-80. "Application"
- B.4. 9 VAC 5-80-140. "Permit shield"
- B.5. 9 VAC 5-80-80. "Application"

FUTURE APPLICABLE REQUIREMENTS

Not Applicable

INAPPLICABLE REQUIREMENTS

New Source Performance Standard (NSPS) Requirements for Steam Generating Units in 40 CFR Part 60, Subpart Dc are not currently applicable. The NSPS requirements are for steam generating units which were constructed, modified, or reconstructed after June 9, 1989.

The 20.2 MMBtu/hr is currently operating under the August 20, 1997 NSR permit. This permit was considered an administrative amendment because there was no change in emissions from the previous March 24, 1986 permit. Since the 1997 permit was an administrative amendment and not a

modification NSPS requirements due not apply.

The 66.6 MMBtu/hr boiler is currently operating under the September 22,1997 NSR permit. The change in fuel from coal to oil and natural gas is not considered applicable to NSPS because it does not increase emissions for any of the NSPS standard pollutants in Dc. All emissions decrease with the change in fuel except VOC. Since VOC is not a standard limited in NSPS Dc, the change is not applicable to NSPS.

The source received a permit dated July 28, 1980 for a pathological incinerator that was removed from the facility in April of 1997. The July 28, 1990 permit is therefore considered obsolete.

INSIGNIFICANT EMISSION UNITS

The insignificant emission units are presumed to be in compliance with all requirements of the Clean Air Act as may apply. Based on this presumption, no monitoring, recordkeeping or reporting shall be required for these emission units in accordance with 9 VAC 5-80-110. Calculations for the coal handling system (EU-05) have been included as Attachment 8 to show that this unit is under 5 tons/yr and is therefore insignificant under 5-80-720 B.1..

Insignificant emission units include the following:

Emission Unit No.	Emission Unit Description	Citation (9 VAC_)	Pollutant Emitted (5-80-720 B.)	Rated Capacity (5-80-720 C.)
EU-05	Coal Handling System *	5-80-720 B.1.	Particulate	N/A
EU-07	Diesel-fired Emergency generator	5-80-720 C.4.	N/A	250 kW
EU-08	Diesel-fired emergency generator	5-80-720 C.4.	N/A	125 kW
EU-09	Diesel-fired emergency generator	5-80-720 C.4.	N/A	80 kW
EU-10	Diesel-fired emergency generator	5-80-720 C.4.	N/A	100 kW
EU-12	Natural gas fired Boiler	5-80-720 C.2.	N/A	1.9 MMBtu/hr

Emission Unit No.	Emission Unit Description	Citation (9 VAC_)	Pollutant Emitted (5-80-720 B.)	Rated Capacity (5-80-720 C.)
EU-13	20,000 gal No. 6 Oil UST tank	5-80-720 B.1	VOC	N/A
EU-14	20,000 gal No. 6 Oil UST tank	5-80-720 B.1.	VOC	N/A
EU-15	20,000 gal No. 6 Oil UST tank	5-80-720 B.1	VOC	N/A
EU-16	10,000 gallon diesel UST	5-80-720 B.1.	VOC	N/A
EU-17	10,000 gallon gasoline UST	5-80-720 B.1.	VOC	N/A
EU-18	850-gallon diesel tank	5-80-720 B.1.	VOC	N/A
EU-19	10, 000 gallon No. 2 Oil AST	5-80-720 B.1.	VOC	N/A

¹The citation criteria for insignificant activities are as follows:

9 VAC 5-80-720 A - Listed Insignificant Activity, Not Included in Permit Application

9 VAC 5-80-720 B - Insignificant due to emission levels

9 VAC 5-80-720 C - Insignificant due to size or production rate

* Refer to Attachment 8 for coal handling system calculations

CONFIDENTIAL INFORMATION

The permittee did not submit a request for confidentiality. All portions of the Title V application are suitable for public review.

PUBLIC PARTICIPATION

The proposed permit will be placed on public notice in the Richmond Times Dispatch from August 6, 2001 to September 4, 2001 .

Attachment 1 - Title V Statement of Basis
Emission Calculation Demonstration for Periodic Monitoring
Keeler 20.2 MMBtu/hr coal fired boiler (EU-02)

Given: Maximum rated capacity of 20.2×10^6 Btu/hr
Max sulfur content of 1 % (Condition # 6 of 8/20/97 NSR Permit)
Max ash content of 7 % (Condition #6 of 8/20/97 NSR Permit)
Heat value of coal = 13,500 Btu/lb (AP-42)
Coal throughput limit = 5,250 tons/yr
(Condition # 5 of 8/20/97 NSR Permit)
Control Equipment: multicyclone
(Condition # 3 of 8/20/97 NSR Permit)

Equation: $\text{lb/hr} = (\text{max rated capacity}) \times (\text{emission factor})$
 $\text{tons/yr} = (\text{throughput limit}) \times (\text{heat value of coal}) \times (\text{emission factor}) \times$
 $(2000 \text{ lb coal} / 1 \text{ ton coal}) \times (1 \text{ ton PM}_{10} / 2000 \text{ lb PM}_{10})$

Factors: $\text{PM}_{10} = 0.27 \text{ lbs}/10^6 \text{ Btu}$
 $\text{SO}_2 = 1.38 \text{ lbs}/10^6 \text{ Btu}$
 $\text{NO}_x = 0.42 \text{ lbs}/10^6 \text{ Btu}$
 $\text{CO} = 0.49 \text{ lbs}/10^6 \text{ Btu}$
 $\text{VOC} = 0.60 \text{ lbs}/10^6 \text{ Btu}$

PM_{10} Emissions:

$0.27 \text{ lbs}/10^6 \text{ Btu} \times 20.2 \text{ MMBtu/hr} = \mathbf{5.5 \text{ lb PM}_{10}/hr}$
 $5250 \text{ tons coal/yr} \times 13,500 \text{ Btu/lb coal} \times 2000 \text{ lb coal/ton coal} \times$
 $0.27 \text{ lb PM}_{10}/\text{MMBtu} \times 1 \text{ ton PM}_{10}/2000 \text{ lb PM}_{10} = \mathbf{19 \text{ tons PM}_{10}/yr}$

SO_2 Emissions:

$1.38 \text{ lbs}/10^6 \text{ Btu} \times 20.2 \text{ MMBtu/hr} = \mathbf{28.0 \text{ lb SO}_2/hr}$
 $5250 \text{ tons coal/yr} \times 13,500 \text{ Btu/lb coal} \times 2000 \text{ lb coal/ton coal} \times$
 $1.38 \text{ lb SO}_2/\text{MMBtu} \times 1 \text{ ton SO}_2/2000 \text{ lb SO}_2 = \mathbf{97.7 \text{ tons SO}_2/yr}$

NO_x Emissions:

$0.42 \text{ lbs}/10^6 \text{ Btu} \times 20.2 \text{ MMBtu/hr} = \mathbf{8.5 \text{ lb NO}_x/hr}$
 $5250 \text{ tons coal/yr} \times 13,500 \text{ Btu/lb coal} \times 2000 \text{ lb coal/ton coal} \times$

$$0.42 \text{ lb NO}_x/\text{MMBtu} \times 1 \text{ ton NO}_x/2000 \text{ lb NO}_x = \mathbf{29.9 \text{ tons NO}_x/\text{yr}}$$

CO Emissions:

$$0.49 \text{ lbs}/10^6 \text{ Btu} \times 20.2 \text{ MMBtu/hr} = \mathbf{9.9 \text{ lb CO/hr}}$$

$$5250 \text{ tons coal/yr} \times 13,500 \text{ Btu/lb coal} \times 2000 \text{ lb coal/ton coal} \times$$

$$0.27 \text{ lb CO/MMBtu} \times 1 \text{ ton CO}/2000 \text{ lb CO} = \mathbf{34.7 \text{ tons CO/yr}}$$

VOC Emissions:

$$0.60 \text{ lbs}/10^6 \text{ Btu} \times 20.2 \text{ MMBtu/hr} = \mathbf{1.2 \text{ lb VOC/hr}}$$

$$5250 \text{ tons coal/yr} \times 13,500 \text{ Btu/lb coal} \times 2000 \text{ lb coal/ton coal} \times$$

$$0.60 \text{ lb VOC/MMBtu} \times 1 \text{ ton VOC}/2000 \text{ lb VOC} = \mathbf{4.1 \text{ tons VOC/yr}}$$

Attachment 2 - Title V Statement of Basis
Emission Calculation Demonstration for Periodic Monitoring
Erie City 66.6 MMBtu/hr natural gas/distillate oil boiler (EU-04)

Given: Maximum rated capacity of 66.6 MMBtu/hr
Heat value of natural gas = 1000 Btu/cubic foot (AP-42)
Natural gas fuel rating = 66.6 MMBtu/hr / 1,000 Btu/cubic foot
= 0.0667 MMCF/hr
Natural Gas throughput limit = 583 million cubic feet/yr
(6,600 hrs/yr) (Condition # 3 of 9/22/97 NSR Permit)
Heat value of fuel oil = 138,000 Btu/gal
Fuel oil fuel rating = 482.6 gal/hr
Fuel Oil throughput limit = 1,042 million gallons/yr (2,160 hrs/yr)
(Condition # 3 of 9/22/97 NSR Permit)

Equation: $\text{lb/hr} = (\text{fuel rating}) \times (\text{emission factor})$
 $\text{tons/yr} = (\text{lb/hr from above}) \times (\text{annual throughput limit}) \times (1 \text{ ton}/2000 \text{ lb})$

Factors (gas): TSP/PM₁₀ = 14 lbs/MMCF (oil): 2 lbs/1000 gal
SO₂ = 0.6 lbs/MMCF 71 lbs/1000 gal
NO_x = 140 lbs/MMCF 20 lbs/1000 gal
CO = 35 lbs/MMCF 5 lbs/1000 gal
VOC = 2.8 lbs/MMCF 0.34 lbs/1000 gal

TSP/PM₁₀ Emissions (gas):
 $0.0667 \text{ MMCF/hr} \times 14 \text{ lbs/MMCF} = \mathbf{0.93 \text{ lbs PM}_{10}/\text{hr}}$
 $0.93 \text{ lbs/hr} \times 6600 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lb} = \mathbf{3.01 \text{ tons PM}_{10}/\text{yr}}$

TSP/PM₁₀ Emissions (Fuel oil):
 $482.6 \text{ gal/hr} \times 2 \text{ lbs}/1000 \text{ gal} = \mathbf{0.97 \text{ lbs PM}_{10}/\text{hr}}$
 $0.97 \text{ lbs/hr} \times 2160 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lb} = \mathbf{1.04 \text{ tons PM}_{10}/\text{yr}}$

CO Emissions (gas):
 $0.0667 \text{ MMCF/hr} \times 35 \text{ lbs/MMCF} = \mathbf{2.33 \text{ lbs CO/hr}}$
 $2.33 \text{ lbs/hr} \times 6600 \text{ hrs/yr} \times 1 \text{ ton}/2000 \text{ lb} = \mathbf{7.69 \text{ tons CO/yr}}$

CO Emissions (Fuel oil):

$$482.6 \text{ gal/hr} \times 5 \text{ lbs/1000 gal} = \mathbf{2.41 \text{ lbs CO/hr}}$$

$$2.41 \text{ lbs/hr} \times 2160 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{2.61 \text{ tons CO/yr}}$$

NOx Emissions (gas):

$$0.0667 \text{ MMCF/hr} \times 140 \text{ lbs/MMCF} = \mathbf{9.32 \text{ lbs NOx/hr}}$$

$$9.32 \text{ lbs/hr} \times 6600 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{30.77 \text{ tons NOx/yr}}$$

NOx Emissions (Fuel oil):

$$482.6 \text{ gal/hr} \times 20 \text{ lbs/1000 gal} = \mathbf{9.65 \text{ lbs NOx/hr}}$$

$$9.65 \text{ lbs/hr} \times 2160 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{10.42 \text{ tons NOx/yr}}$$

SO₂ Emissions (gas):

$$0.0667 \text{ MMCF/hr} \times 0.6 \text{ lbs/MMCF} = \mathbf{0.04 \text{ lbs SO}_2\text{/hr}}$$

$$0.4 \text{ lbs/hr} \times 6600 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{0.13 \text{ tons SO}_2\text{/yr}}$$

SO₂ Emissions (Fuel oil):

$$482.6 \text{ gal/hr} \times 71 \text{ lbs/1000 gal} = \mathbf{34.27 \text{ lbs SO}_2\text{/hr}}$$

$$34.27 \text{ lbs/hr} \times 2160 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{37.01 \text{ tons SO}_2\text{/yr}}$$

VOC Emissions (gas):

$$0.0667 \text{ MMCF/hr} \times 2.8 \text{ lb/MMCF} = \mathbf{0.19 \text{ lbs VOC/hr}}$$

$$0.19 \text{ lbs/hr} \times 6600 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{0.63 \text{ tons VOC/yr}}$$

VOC Emissions (Fuel oil):

$$482.6 \text{ gal/hr} \times 0.34 \text{ lbs/1000 gal} = \mathbf{0.16 \text{ lbs VOC/hr}}$$

$$0.16 \text{ lbs/hr} \times 2160 \text{ hrs/yr} \times 1 \text{ ton/2000 lb} = \mathbf{0.18 \text{ tons VOC/yr}}$$

Note: Permit Emission limits based on maximum hourly emissions from fuel oil and gas. Annual permit limits are based on the combination of tons/yr for both fuel oil and natural gas.

Attachment 3 - Title V Statement of Basis
Emission Calculation Demonstration for Periodic Monitoring
Existing Boiler Calculations using Existing Source Rule 4-8:
Babcock and Wilcox 34.3 MMBtu/hr residual oil boiler (EU-01)
Todd 60 MMBtu/hr residual oil boiler (EU-03)
16.6 MMBtu/hr natural gas boiler (EU-11)

Particulate Emission Factor Equation:

$$E = 1.0906 H^{-0.2594}$$

E = Maximum allowable emission ratio in
pounds of particulate per million Btu input
H = Total capacity in millions of Btu per hour

(9 VAC 5-40-900.A.1b)

Particulate Emissions:

$$P = C \times E$$

P = Max Allowable Particulate Emissions
C = Equipment Rated Capacity
E = Maximum allowable emission ratio in pounds of particulate per
million Btu input

Equation derived from (9 VAC 5-40-900.2.B.1)

Particulate Calculation:

$$\text{Total Capacity (H)} = 34.3 \text{ MMBtu/hr} + 60.07 \text{ MMBtu/hr} + 16.6 \text{ MMBtu/hr} = 110.97 \text{ MMBtu/hr}$$

$$E = 1.0906 (110.97 \text{ MMBtu/hr})^{-0.2594}$$
$$E = 0.32 \text{ lb/MMBtu}$$

Sulfur Equation: $S = 2.64 K$

S = Allowable emission of sulfur dioxide expressed in lb/hr.

K = Heat input at total capacity expressed in Btu x 10^6 per hour.

(9 VAC 5-40-930.1)

Note: No annual emission limitations are required by Rule 4-8 of State regulations

The Maximum allowable particulate and sulfur emissions for each boiler are as follows:

Babcock and Wilcox 34.3 MMBtu/hr residual oil boiler (EU-01)

$$P = 0.32 \text{ lb/MMBtu} \times 34.3 \text{ MMBtu/hr} = \mathbf{11.0 \text{ lbs/hr}}$$

$$S = 2.64 * 34.4 \text{ MMBtu/hr} = \mathbf{90.9 \text{ lbs/hr}}$$

Todd 60 MMBtu/hr residual oil boiler (EU-03)

$$P = 0.32 \text{ lb/MMBtu} \times 60 \text{ MMBtu/hr} = \mathbf{19.2 \text{ lbs/hr}}$$

$$S = 2.64 * 60 \text{ MMBtu/hr} = \mathbf{158.4 \text{ lbs/hr}}$$

16.6 MMBtu/hr natural gas boiler (EU-11)

$$P = 0.32 \text{ lb/MMBtu} \times 16.6 \text{ MMBtu/hr} = \mathbf{5.4 \text{ lbs/hr}}$$

$$S = 2.64 * 16.6 \text{ MMBtu/hr} = \mathbf{43.9 \text{ lbs/hr}}$$

Attachment 4 - Title V Statement of Basis
 Emission Calculation Demonstration for Periodic Monitoring
 Existing Boiler Calculations using AP-42 Factors:
 Babcock and Wilcox 34.3 MMBtu/hr residual oil boiler (EU-01)

Given:

Maximum rated capacity of 34.3 MMBtu/hr

Fuel: #6 fuel oil (residual)

Heat value of fuel oil = 150,000 Btu/gal

Fuel oil fuel rating =

$$\frac{34.3 \text{ MMBtu}}{\text{hr}} \times \frac{\text{gal}}{150,000 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} = 229 \text{ gal/hr}$$

Equation: lb/hr = (fuel rating) x (emission factor)

Factors (#6 oil):	TSP = 8.34*A lbs/1000 gal (A = 1.12 * S + 0.37)	AP-42 Table 1.3-5 9/98
	PM ₁₀ = 7.17 *A lbs/1000 gal (A = 1.12 * S + 0.37)	AP-42 Table 1.3-5 9/98
	SO ₂ = 157S lbs/1000 gal	AP-42 Table 1.3-1 9/98
	NO _x = 55 lbs/1000 gal	AP-42 Table 1.3-1 9/98
	CO = 5 lbs/1000 gal	AP-42 Table 1.3-1 9/98
	VOC = 0.28 lbs/1000 gal	AP-42 Table 1.3-3 9/98

Note: A maximum sulfur content for the # 6 fuel oil was calculated using the existing sulfur emission limit in order to compare the existing source limitations to AP-42 limitations. The maximum sulfur was calculated to be 2.5%. This value is considered to be a conservative value since most fuel oils fall between .5% and 2% sulfur content. In 1999, the facility based on the years inventory report used 2% sulfur content #6 fuel oil which is under the maximum of 2.5% sulfur content. 2.5 % was used in the following calculations as the maximum in determining the TSP, PM₁₀ and SO₂ emission factors which are based on the sulfur content. See the sample following calculation of how the maximum 2.5% value was obtained:

Existing source calculation emission limit from Attachment 3 = 90.9 lbs/hr

$$90.9 \frac{lb}{hr} = 228.9 \frac{gal}{hr} \times 157 \times S \frac{lb}{1000 gal}$$

Solve for S = 2.52% To be conservative 2.5% will be used in calculations.

TSP Emissions:

$$229 \text{ gal/hr} \times 8.34 (1.12 * 2.5 + 0.37 \text{ lbs/1000 gal}) = \mathbf{6.05 \text{ lbs PM}_{10}/hr}$$

PM₁₀ Emissions:

$$229 \text{ gal/hr} \times 7.17 (1.12 * 2.5 + 0.37 \text{ lbs/1000 gal}) = \mathbf{5.2 \text{ lbs PM}_{10}/hr}$$

CO Emissions:

$$229 \text{ gal/hr} \times 5 \text{ lbs/1000 gal} = \mathbf{1.2 \text{ lbs CO/hr}}$$

NOx Emissions:

$$229 \text{ gal/hr} \times 55 \text{ lbs/1000 gal} = \mathbf{12.6 \text{ lbs NOx/hr}}$$

SO₂ Emissions:

$$229 \text{ gal/hr} \times (157 * 2.5) \text{ lbs/1000 gal} = \mathbf{89.9 \text{ lbs SO}_2/\text{hr}}$$

VOC Emissions:

$$229 \text{ gal/hr} \times 0.28 \text{ lbs/1000 gal} = \mathbf{0.1 \text{ lbs VOC/hr}}$$

Attachment 5 - Title V Statement of Basis
 Emission Calculation Demonstration for Periodic Monitoring
 Existing Boiler Calculations using AP-42 Factors:
 Todd 60 MMBtu/hr residual oil boiler (EU-03)

Given:

Maximum rated capacity of 60 MMBtu/hr

Fuel: #6 fuel oil (residual)

Heat value of fuel oil = 150,000 Btu/gal

Fuel oil fuel rating =

$$\frac{60 \text{ MMBtu}}{\text{hr}} \times \frac{\text{gal}}{150,000 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{\text{MMBtu}} = 400 \text{ gal/hr}$$

Equation: $\text{lb/hr} = (\text{fuel rating}) \times (\text{emission factor})$

Factors (#6 oil):	TSP = 8.34*A lbs/1000 gal (A = 1.12 * S + 0.37)	AP-42 Table 1.3-5 9/98
	PM ₁₀ = 7.17 *A lbs/1000 gal (A = 1.12 * S + 0.37)	AP-42 Table 1.3-5 9/98
	SO ₂ = 157S lbs/1000 gal	AP-42 Table 1.3-1 9/98
	NO _x = 55 lbs/1000 gal	AP-42 Table 1.3-1 9/98
	CO = 5 lbs/1000 gal	AP-42 Table 1.3-1 9/98
	VOC = 0.28 lbs/1000 gal	AP-42 Table 1.3-3 9/98

Note: A maximum sulfur content for the # 6 fuel oil was calculated using the existing sulfur emission limit in order to compare the existing source limitations to AP-42 limitations. The maximum sulfur was calculated to be 2.5%. This value is considered to be a conservative value since most fuel oils fall between .5% and 2% sulfur content. In 1999, the facility based on the years inventory report used 2% sulfur content #6 fuel oil which is under the maximum of 2.5% sulfur content. 2.5 % was used in the following calculations as the maximum in determining the TSP, PM₁₀ and SO₂ emission factors

which are based on the sulfur content. See the sample following calculation of how the maximum 2.5% value was obtained:

Existing source calculation emission limit from Attachment 3 = 158.4 lbs/hr

$$158.4 \frac{lb}{hr} = 400 \frac{gal}{hr} \times 157 \times S \frac{lb}{1000 gal}$$

Solve for S = 2.52 % To be conservative 2.5% will be used in calculations.

TSP Emissions:

$$400 \text{ gal/hr} \times 8.34 (1.12 \times 2.5 + 0.37 \text{ lbs/1000 gal}) = \mathbf{10.6 \text{ lbs PM}_{10}/\text{hr}}$$

PM₁₀ Emissions:

$$400 \text{ gal/hr} \times 7.17 (1.12 \times 2.5 + 0.37 \text{ lbs/1000 gal}) = \mathbf{9.1 \text{ lbs PM}_{10}/\text{hr}}$$

CO Emissions:

$$400 \text{ gal/hr} \times 5 \text{ lbs/1000 gal} = \mathbf{2 \text{ lbs CO/hr}}$$

NO_x Emissions:

$$400 \text{ gal/hr} \times 55 \text{ lbs/1000 gal} = \mathbf{22 \text{ lbs NO}_x/\text{hr}}$$

SO₂ Emissions:

$$400 \text{ gal/hr} \times (157 \times 2.5) \text{ lbs/1000 gal} = \mathbf{157 \text{ lbs SO}_2/\text{hr}}$$

VOC Emissions:

$$400 \text{ gal/hr} \times 0.28 \text{ lbs/1000 gal} = \mathbf{0.2 \text{ lbs VOC/hr}}$$

Attachment 6 - Title V Statement of Basis
Emission Calculation Demonstration for Periodic Monitoring
Existing Boiler Calculation using AP-42 Factors:
16.6 MMBtu/hr natural gas boiler (EU-11)

Given:

Maximum rated capacity of 16.6 MMBtu/hr

Fuel: natural gas

Heat value of natural gas = 1000 Btu/cubic foot (AP-42)

Natural gas fuel rating = 16.6 MMBtu/hr / 1,000 Btu/cubic foot
= 0.0166 MMCF/hr

Natural gas fuel rating =

$$\frac{16.6 \text{ MMBtu}}{\text{hr}} \times \frac{\text{CF}}{1,000 \text{ Btu}} \times \frac{10^6 \text{ Btu}}{1 \text{ MMBtu}} \times \frac{1 \text{ MMCF}}{10^6 \text{ CF}} = 0.0166 \frac{\text{MMCF}}{\text{hr}}$$

Equation: $\text{lb/hr} = (\text{fuel rating}) \times (\text{emission factor})$

Factors (gas):

TSP/PM₁₀ = 7.6 lbs/MMCF

AP-42 Table 1.4-2 7/98

SO₂ = 0.6 lbs/MMCF

AP-42 Table 1.4-2 7/98

NO_x = 100 lbs/MMCF

AP-42 Table 1.4-1 7/98

CO = 84 lbs/MMCF

AP-42 Table 1.4-1 7/98

VOC = 5.5 lbs/MMCF

AP-42 Table 1.4-2 7/98

TSP/PM₁₀ Emissions:

0.0166 MMCF/hr x 7.6 lbs/MMCF = **0.13 lbs PM₁₀/hr**

CO Emissions:

0.0166 MMCF/hr x 84 lbs/MMCF = **1.4 lbs CO/hr**

NO_x Emissions:

0.0166 MMCF/hr x 100 lbs/MMCF = **1.7 lbs NO_x/hr**

SO₂ Emissions:

$$0.0166 \text{ MMCF/hr} \times 0.6 \text{ lbs/MMCF} = \mathbf{0.01 \text{ lbs SO}_2\text{/hr}}$$

VOC Emissions:

$$0.0166 \text{ MMCF/hr} \times 5.5 \text{ lb/MMCF} = \mathbf{0.1 \text{ lbs VOC/hr}}$$

Attachment 7 - Title V Statement of Basis
 Table Comparing Existing Source limits of Rule 4-8 with AP-42 limits
 Babcock and Wilcox 34.3 MMBtu/hr residual oil boiler (EU-01)
 Todd 60 MMBtu/hr residual oil boiler (EU-03)
 16.6 MMBtu/hr natural gas boiler (EU-11)

Boiler	TSP (lbs/hr)		PM10 (lbs/hr)		SO ₂ (lbs/hr)		NO _x (lbs/hr)		CO (lbs/hr)		VOC (lbs/hr)	
	Rule 4-8	AP-42	Rule 4-8	AP-42	Rule 4-8	AP-42	Rule 4-8	AP-42	Rule 4-8	AP-42	Rule 4-8	AP-42
EU-01	11.0	6.05	11.0	5.2	90.9	89.9		12.6		1.2		0.1
EU-03	19.2	10.6	19.2	9.1	158.4	157.0		22.0		2		0.2
EU-11	5.4	0.13	5.4	0.13	43.9	0.01		1.7		1.4		0.1

Note:

Rule 4-8 only requires limitations on PM and SO₂. Therefore, comparisons need only be made for these two pollutants.